# Curriculum Vitae

**Name:** SIRSHENDU DE

**Date of Birth:** Oct. 7, 1967

## Academic Qualifications:

B. Tech. 1986-90 : Department of Chemical Engg., IIT Kanpur. **CPI: 8.2/10.0**.
M. Tech. 1991-92 : Department of Chemical Engg., IIT Kanpur. **CPI: 10.0/10.0.**
Ph.D. 1993-1997 : Department of Chemical Engg., IIT Kanpur. **CPI: 10.0/10.0.**

## Present employment and post held:

Professor, 2007 - present
Department of Chemical Engineering, IIT Kharagpur; Teaching and Research.

## Positions held during the period

***Professor, April 12, 2007-Present:*** Department of Chemical Engineering, IIT Kharagpur

***Associate Professor, Jun. 25, 2002-April 12, 2007:*** Department of Chemical Engineering, IIT Kharagpur.

***Assistant Professor, 13 Feb., 1998-Jun. 25, 2002:*** Department of Chemical Engineering, IIT Kharagpur.

***Visiting Faculty, July 09, 1997- 13 Feb., 1998:*** Department of Chemical Engineering, IIT Kharagpur.

***Senior Project Engineer. Oct. 96-July, 1997:*** Department of Chemical Engineering, IIT Kanpur.

## Head of the Department: 2015-2017

## Major Research Interests

Membrane separations (analysis, design and development of ultrafiltration / reverse osmosis systems), Application of mathematical methods and modeling for transport processes; Heat and mass transfer; Modeling of material processing; Pollution control; Effluent treatment.

## Awards & Honours

- **Institute Chair Professor** Award for three years, IIT Kharagpur, 2020.
- **K N Khosla National Award 2017** from IIT Roorkee, 2019.
- **NRDC National Meritorious Invention Awards – 2018** (under **SOCIETAL INNOVATION CATEGORY**), 2019.
- **Vice-Chancellor's Innovation Award for Team Work**, Oxford University, UK, 2018.
- **Abdul Kalam Technology Innovation National Fellowship** by the Indian National Academy of Engineering & SERB, DST, 2018-2021.
- **Hindustan Dorr-Oliver Award** from Indian Institute of Chemical Engineers for the Year 2017 for Excellence in use of Science and Technology in Rural Development
- **Dr. A. V. Rama Rao Foundations's award**, for supervising best PhD thesis of Dr. Sourav Mondal from Indian Institution of Chemical Engineers, 2017.
- **3rd Joint Prize** for **Filter for Arsenic** in Exhibition and Innovation in Medical Science & Biotechnology, organized by **National Innovation Foundation India, Indian Council of Medical Research and Biotechnology Industry Research Assistance Council**, New Delhi, 2017.
- **Innovation Award 2016** from **Indian Desalination Association, 2016.**
- **INAE Chair-Professor 2015-2017 from Indian National Academy of Engineering, New Delhi.**
- **DST Lockheed-Martin top 10 award for the project "**Development of low cost hemodialysis cartridge", 2015**.**
- **5 th National Award for Technology Innovation in various Field of Petrochemicals and Downstream Plastic Processing Industry from Central Institute of Plastic Engineering & Technology** for "Development of low cost hemodialysis cartridges", **2015**.
- **CSMCRI Distinguished Speaker Award in CHEMCON 2015 & 2013 from** Indian Institution of Chemical Engineers.
- **NASI-Reliance Industries Platinum Jubilee award, 2013, from National Academy of Science, Allahabad.**
- **Silver Jubilee Young Engineer Award**, 2012 from **Indian National Academy of Engineering, New Delhi**
- **DAE-SRC Oustanding Investigator Award,** 2012 from Department of Atomic Energy, Govt. of India.
- **Shanti Swarup Bhatnagar Prize,** 2011 for outstanding works in Science and Engineering, from CSIR, Govt. of India.
- **Herdillia Award,** for the year 2010 for Excellence in Basic Research in Chemical Engineering, from Indian Institution of Chemical Engineers, 2010.
- **Dr. A. V. Rama Rao Foundations's award**, for supervising best PhD thesis of Dr. Chandan Das from Indian Institution of Chemical Engineers, 2010.
- **Best Reviewer Award for year 2010** from **Desalination, Elsevier**.
- **V.N.M.M award,** for the year 2009 for innovative and creative work in the field of engineering in India in any discipline, by IIT Roorkee.
- **Dr. A. V. Rama Rao Foundations's award**, for supervising best PhD thesis of Dr. M. K. Purkait from Indian Institution of Chemical Engineers, 2007.
- **Sisir Kumar Mitra memorial award** from Indian Institution of Chemical Engineers, 2003

- **Young Engineer Award, Department of Science & Technology**, 2001 (Fast Track Scheme)
- **INAE Young Engineer award** for the year 2001 for excellence in basic research by Indian National Academy of Engineering.
- **Amar Dye Chem award** for the year 2000 for excellence in basic research in Chemical Engineering by Indian Institue of Chemical Engineers.
- **K. F. Antia memorial award** from Institute of Engg. India, for 1994-95 for the article 'Analytical solution of transient heat conduction with variable thermal conductivity in a finite domain'. The award was received from ***the President of India*** on Dec. 20, 1995 at Jaipur, India.
- **Best Poster Award** in International Conference on Nano Science & Technology (**ICONSAT 2010**) held at BARC for the poster "Oxide nanoparticles of iron and aluminium prepared by sol-gel method from liquid fraction of HCl treated laterite: Arsenic adsorption performance".

## Honours

- **Fellow, Indian Desalination Association, 2021.**
- **Adjunct Faculty, National Metallurgical Laboratories, Jamshedpur, 2014.**
- **Fellow, National Academy of Science, Allahabad,** 2012.
- **Fellow, Indian National Academy of Engineering,** 2011.
- **Award committee member for Young Scientist Award, CSIR, Govt. of India**, 2013.
- **Award committee member in Indian Institute of Chemical Engineers,** 2012.
- "**C. V. Seshadri Lecture, 2012**", Department of Chemical Engineering, IIT Kanpur, 2012.
- "**K. C. Khilar Memorial Lecture and Fellowship**", Department of Chemical Engineering, IIT Bombay, 2012.
- "**Shrimati Kusumben and Shri Mathradas Kothari Visiting Professorship in Chemical Engineering**" in Institute of Chemical Technology (ICT), Mumbai for 2011.
- **Member of Award Committee of Indian Institute of Chemical Engineers, 2012.**
- **Editorial board member** of **Journal of Assam Science Society** for 2003-2006
- **Guest Editor, International Journal of Environmental and Waste Management**, for special issue, "Environmental and Industrial waste management using membrane separation and bioremediation", Inderscience Publishers, USA.
- **Editorial Board Member, International Journal of Environment and Engineering Sciences**, Serials Publishers, USA.
- **Editorial Board Member, International Journal of Environmental and Engineering,** Inderscience Publishers, USA.
- **Editorial Board Member, International Journal of Chemistry,** Canadian center of Science & Education.
- **Second best paper presentation award** for the paper entitled "Treatment Of Textile Plant Effluent Using Cross Flow Nanofiltration", presented in Chemcon-2001, Chennai, India.
- **13$^{th}$** rank in the secondary examination in West Bengal Board, 1984.

## Student Awards

- **Chirasmita Panigrahi, Gandhian Young Technological Innovation [GYTI] Appreciation, 2021**
- **Chirasmita Panigrahi, NRDC National Meritorious Invention Awards, 2020.**
- **Sankha Karmakar & Debashis Roy, DST Lockheed Martin Award, 2019.**
- **Somak Chatterjee & K V Krishnasri: DST Lockheed Martin Award, 2018.**
- **Sourav Mondal: Dr. A. V. Rama Rao Foundations's award**, for best PhD thesis from Indian Institution of Chemical Engineers, 2017.
- **Somak Chatterjee:** Mahindra Environrise Awards, for best product innovation related to cost effective and gravity driven fluoride filters, 2017.
- **Anirban Roy:** INAE Innovative Student Projects Award at Doctoral Level, 2017.
- **Somak Chatterjee:** Second prize winner for oral presentation in Research Scholars Day – Department of Chemical Engineering, IIT Kharagpur, 2016.
- **Sourav Sengupta:**Indian Insitute of Chemical Engineers (IIChE) Ambuja's Young Researcher's Award, 2016.
- **Sourav Sengupta:** INAE Innovative Student Projects Award at Master's Level, 2016.
- **Anirban Roy**: IChemE Global Award (Top 5 shortlist) for DhirubhaiAmbani Award for Outstanding Chemical Engineering Innovation for Resource-poor people, 2015.
- **Anirban Roy:** Department of Science and Technology (Govt. of India)- Lockheed Martin – Gold Medal – Top 10 Innovation Award- IC2 Business Development Support, 2015.
- **Anirban Roy:** National Award (Govt. of India) for Technology Innovation in various fields of Petrochemicals and Downstream Plastic Processing Industry, 2015.
- **Anirban Roy:** Young Innovator of India at Health Technology Innovations (IIT Bombay) under "Make in India" Conclave, 2015.
- **Anirban Roy**: Simulanis Research Challenge- Top 3 Innovations in India, 2015.
- **Anirban Roy**: Best Oral Presentation Award in Research Scholars Day – Department of Chemical Engineering, IIT Kharagpur, 2015.
- **Somak Chatterjee-** Third prize winner in for poster presentation in Research Scholars Day – Department of Chemical Engineering, IIT Kharagpur, 2015.
- **Raka Mukherjee:** Gandhian Young Technological Innovation Award for "Adsorptive removal of phenolic compounds using mixed matrix membrane of cellulose acetate phthalate and alumina nanoparticle", 2014
- **Somak Chatterjee:** Second prize winner in for poster presentation in Research Scholars Day – Department of Chemical Engineering, IIT Kharagpur, 2013.
- **Sourav Mondal:** ShastriIndo- Canadian Institute Faculty and Student Mobility Award, 2013.
- **Chandan Das: Dr. A. V. Rama Rao Foundations's award**, for best PhD thesis from Indian Institution of Chemical Engineers, 2010.
- **Mihir Kumar Purkait: Dr. A. V. Rama Rao Foundations's award**, for best PhD thesis from Indian Institution of Chemical Engineers, 2007.

## Book Review:

**S. De,** "A review of: Nonporous Inorganic Membranes for Chemical Processing, A. F. Sammells and M. V. Mundschau (Editors)", Materials and Manufacturing Processes, 23:7, 734, 2008.

## Patent:

## Granted

1) "Electric field assisted membrane separation of pectin", Indian patent, approval no: 274256, 2016.
2) "Process for recovery of inorganic chemicals from kraft black liquor". Indian Patent approval number: 189310 (2005).
3) "Production of organic fertilizer from tannery effluent" Indian patent, approval no: 269013 (2015).
4) "Portable affordable water purification kit", Indian Design patent, approval no:290893.
5) "Modified laterite arsenic adsorbent for removing arsenic species and its manner of manufacture", Indian patent, approval no:285778 .
6) "Chitosan coated iron-oxide- polyacrylonitrile mixed matrix membrane for removal of humic acid", Indian Patent, approval no:319460.
7) "A flat sheet mixed-matrix membrane (MMM) involving cellulose acetate phthalate (CAP) and powdered activated carbon (PAC) to treat industrial effluent and the process of its manufacture", Indian Patent approval no:335085.

## Applied

1) "Aluminium substituted Hydroxyapatite Incorporated Wood Charcoal for Fluoride Removal from Groundwater", filed for Indian patent (202231011025).
2) "Hybrid technology for treatment of rice mill effluent", filed for Indian patent (202031034627).
3) "Aluminum fumarate – polyacrylonitrile mixed matrix beads for fluoride remediation from groundwater", filed for Indian patent (201931035634).
4) "Shelf life Extension of Sugarcane Juice using Ozone assisted Cold Sterilization Technology", filed for Indian patent (201931028607).
5) "A process and system for treating total and free cyanide from wastewater of coke plant", filed for Indian Patent (201931002637).
6) "Process of preparing chemically treated carbonized bone meal", filed for Indian Patent (201731035806).
7) "A process for purification of graphene oxide", filed for Indian Patent (201731033688).
8) "Hollow fiber nanofiltration membrane involving ZnCl2 incorporated Polysulfone (PSF)/Polyethyleneglycol", filed for Indian Patent (742/KOL/2014).
9) "Ultrafiltration membrane for cold sterilization of bottle gourd juice (Lagenaria Siceraria) for extended shelf life", filed for Indian Patent (724/KOL/2014).
10) "A polyacrylonitrile (PAN) based hollow fibre membrane for clarification of tender coconut water with desired storage stability", filed for Indian Patent (768/KOL/2014).
11) "Low cost spinning and fabrication of high efficiency (he) haemodialysis fibers & method thereof", filed for Indian Patent (754/KOL/2014) and US patent ( Application No. 14/598,697 dated January 16, 2015 and publishing no.US2016/0008528 dated Jan 14, 2016).

12) "Design of a laterite based arsenic filter for domestic and community scale", filed for Indian Patent (597/KOL/2013).
13) "A Novel Set up for Spinning Polymeric Hollow Fiber Membrane", filed for Indian patent (582/KOL/2011).
14) "Membrane based water-extraction of polyphenols from green tea leaves", filed for Indian patent (1046/KOL/2007).

## Technology Transfer:

(1) "Spinning of Hollow fiber membranes" is transferred to M/s, Biomimicry Technologies Pvt. Ltd., New Delhi, 2022.
(2) "Preparation of Al-HAP carbon based media for the removal of fluoride from groundwater" is transferred to M/s, Mondal Precisions Pvt. Ltd., Howrah. West Bengal, 2022.
(3) "Treatment technology for rice mill effluent", is transferred to M/s, Electroplaza Project Pvt. Ltd., Kolkata, 2020.
(4) "Arsenic free drinking water" is transferred to M/s, Technoquips Separation Pvt. Ltd., Kharagpur. West Bengal, 2019.
(5) "Arsenic free drinking water" is transferred to M/s, Mondal Precisions Pvt. Ltd., Howrah. West Bengal, 2016.
(6) "Arsenic free drinking water", is transferred to M/s, VAS BROS Enterprises Pvt. Ltd., Ranchi, Jharkhand, 2015.
(7) "Technology for extraction of polyphenol from green tea leaves" is transferred to M/s Rangpur Tea Association Ltd., Alipurduar, Jalpaigudi, West Bengal, 2006.
(8) "Technology for extraction of polyphenol from green tea leaves" is transferred to M/s Phytobiotech Pvt. Ltd, Kolkata, West Bengal, 2008.

## Books:

1. S. Mondal, M. K. Purkait and **S. De,** "Advances in dye removal technologies", **Springer, 2017,** ISBN 9789811062933 **(no of pages: 206).**
2. S. De and **A. Roy**, "Hemodialysis Membranes: For Engineers to Medical Practitioners", **CRC Press**, **Taylor & Francis**, 2017, ISBN 9781138032934 **(no of pages: 214)**.
3. **S. De,** S. Banerjee and S. Mondal, "Stevioside: Technology, Applications and Health", **Wiley-Blackwell**, 2013, ISBN:9781118350669, 2013 (**no. of pages 250**).
4. **S. De** and S. Mondal, "Micellar enhanced Ultrafiltration: A surfactant mediated membrane based process", **CRC Press, Taylor and Francis**, 2012, USA; ISBN: 9781439895689, 2012 (**no. of pages 204**).
5. **S. De** and A. Maiti, "Arsenic removal from contaminated groundwater using laterite based adsorption technique", by **TERI Press**, ISBN: 9788179933831, 2011, India (**no. of pages 287)**.
6. **S. De**, "Novel Separation Processes", Web book, The National Programme on Technology Enhanced Learning, Ministry of Human Resource & Development, Government of India, 2010 (**no. of pages 267**).

7. **S. De**, C. Das, S. DasGupta "Treatment of Tannery effluent by membrane separation technology", **Nova Science Publishers. Inc.,** USA, 2010, ISBN: 978-1-60741-836-8 (**no. of pages 156**).
8. **S. De**, B. Sarkar, S. DasGupta, "Electric filed enhanced membrane separation system: Principles and Typical applications", **Nova Science Publishers. Inc.,** USA, 2010, ISBN: 978-1-60741-592-3 (**no. of pages 204**).
9. **S. De,** S. DasGupta and S. Ranjith "Membrane based clarification/concentration of Fruit Juice", **Nova Science Publishers Inc.,** USA, 2009. ISBN: 978-1-60456-738-0 (**no. of pages 75**).

## Book Chapter:

1. K. V. Krishnasri, S. De, "Modeling aspects of membrane based industrial wastewater", in Membrane Based Hybrid Processes for Wastewater Treatment, **Elsevier,** edited by M. Shah, S. Rodriguez-Couto, The Netherlands, 2021.

2. K. V. Krishnasri, S. Mondal, **S, De**, "Modeling of membrane separation of the bioactives", in Membrane Separation of Food Bioactives Ingredients, **Springer**, edited by S. M. Jafari, R. Castro-Munoz, Switzerland, 2021.

3. S. Mondal and **S. De**, "Reverse osmosis modeling, simulation, and optimization" in Current Trends and Future Developments on (Bio-) Membranes, **Elsevier**, edited by A. Basile, K. Ghasemzadeh, The Netherlands, 2019.

4. A. Jain and **S. De**, "Processing of Beverages by Membrane" in Processing and Sustainability of Beverages (Vol 2:The Science of Beverages), **Elsevier**, edited by A. Grumezescu and A. M. Holban, The Netherlands, 2018.

5. S. Karmakar and **S. De**, "Pectin removal and clarification of juices" in Separation of Functional Molecules in Food by Membrane Technology, **Elsevier (Academic Press),** edited by C. H. Galanakais, The Netherlands, 2018.

6. S. Chatterjee and **S. De**, "Fabrication and applications of functionalized membranes in drinking water treatment", in Membrane Technology: Sustainable solutions in water, health, energy and environmental sectors, **CRC Press**, edited by S. Sridhar, 2018.

7. S. Mondal and **S. De**, "Processing of stevioside using membrane-based separation processes", in **Integrated Membrane Operations,** Walter De Gruyter**,** edited by A. Cassano and E. Drioli, USA, 2013.

8. N. Vasu and **S. De**, "Mass transport issues in micro and nano-scales", in **Microfluidics and Nanofluidics Handbook- Vol 1** from CRC Press/Taylor & Francis Group, LLC, edited by S. K. Mitra and S. Chakraborty, ISBN: 978-1-4398167-6-9 , USA, 2011.

9. **S. De** and P. Banerjee, "Treatment of Textile Plant Effluent Using Membrane Based Separation Processes: A Brief Review" in **Membrane Technologies and Applications**, edited by K. Mohanty and M. K. Purkait, Taylor and Francis, USA, 2011.

10. **S. De** and P. Rai, "Application of membrane separation processes for clarification of fruit juice and beverages" in **Membrane Technologies and Applications**, edited by K. Mohanty and M. K. Purkait, Taylor and Francis, USA, 2011.

11. **S. De** and C, Das, "Membrane separation for water and waste treatment", in **Handbook of Environmental and Waste Management**, edited by Y.T. Hung, L. K.Wang and N. Shammas, World Scientific Publishing Co., Singapore, ISBN: 978-981-4327-69-7; 2012.
12. **S. De**, "Mass transfer coefficient for laminar flow in membrane modules: Applications in clarification/concentration of fruit juice", Chapter 8, in **Fruit juices; Properties, consumption and nutrition**, edited by P. G. Scardina, Nova Science Publishers Inc., USA, ISBN: 978-1-60741-505-3, 2009.
13. **S. De** and B. Sarkar, "Application of external electric field for efficient clarification of citrus fruit juice", Chapter 9, in **Fruit juices; Properties, consumption and nutrition**, edited by P. G. Scardina, Nova Science Publishers Inc., USA, ISBN: 978-1-60741-505-3, 2009.
14. **S. De**, S. DasGupta and S. Ranjith, "Effects of permeation on mass transfer coefficient for laminar non-Newtonian fluid flow in membrane modules during clarification/concentration of fruit juice" in **Focus on Food Engineering Research & Developments**, edited by V. N. Pletney, Chapter 7, Nova Science Publishers. Inc., USA, ISBN:1-60021-898-9, 397-452, 2007.
15. P. K. Bhattacharya and **S. De**, "Application of membrane separation technology for recovery of water and inorganics from kraft paper mill black liquor", in **Advances in Industrial Wastewater Treatment**, Ed. by P. K. Goel,304-318, 1999.

## Courses Developed:

- Developed online web course "Introduction to Membrane based separation processes" as a part of Mass Transfer Operations in SWAYAM course, 2018.
- Developed online course "Introduction to Process Modeling in Membrane Separation Process" under Massive Open Online Course (MOOC), Ministry of Human Resource & Development, Government of India, 2016.
- Developed online course "Partial Differential Equations (PDE) for Engineers: Solution by Separation of Variables" under Massive Open Online Course (MOOC), Ministry of Human Resource & Development, Government of India, 2016.
- Developed **video and Web-based** course for the subject "Novel Separation Processes" under The National Programme on Technology Enhanced Learning, Ministry of Human Resource & Development, Government of India, 2010.
- Developed **video** course for the subject "Advanced Mathematical Techniques for Chemical Engineering" under The National Programme on Technology Enhanced Learning, Ministry of Human Resource & Development, Government of India, 2012.

## List of completed PhDs

1) Shanmuk Srinivas Ravuru, Contaminants removal from aqueous solution by engineered layered double hydroxides, 2022, Thesis submitted.
2) Debashis Roy, Metal organic frameworks based heterojunction catalysts and mixed matrix adsorbents: applications in contaminated water remediation, 2022, Thesis submitted.
3) Shikha Sinha, Water management during hydrofracking operations of shale gas fields, 2022.
4) Chirasmita Panigrahi, Shelf life extension of sugarcane juice using non-thermal technology, 2022.
5) Sourav Sengupta, Hydrodynamic stability of non-Newtonian fluid-porous channel flows, 2021.
6) Amit Jain, Membrane based clarification of vegetable and spice extract for longer shelf life: a case study for bitter gourd (Momordica charantia) and ajwain (Trachyspermum ammi), 2021.
7) K V Krishnasri, Thermodynamic and kinetic study of nonsolvent induced phase separation during membrane formation, 2020.
8) Saikat Bhattacharjee, "Solute transport across the porous wall of narrow confined conduit", 2020.
9) Sankha Karmakar, "Metal organic frameworks: Potential in water treatment and application in mixed matrix media", 2019.
10) Mrinmoy Mondal, "Preparation, characterization and applications of membranes by polymer blends, interfacial polymerization and inorganic additive", 2018.
11) Somak Chatterjee, "Removal of fluoride and other contaminants from drinking water", 2018.
12) Dipankar Pal, "Surface modification of polyacrylonitrile copolymer membranes using low temperature plasma treatment", 2018.
13) Raka Mukherjee, "Preparation, Characterization and applications of mixed matrix membranes", 2017.
14) Anirban Roy, "Development of ultra low cost hemodialysis fibers", 2016.

15) Sourav Mondal, "Transport Phenomena and mathematical modeling in Membrane Separation", 2015.
16) Swapna Rekha Panda, "Casting, characterization and applications of blended polymeric membranes", 2015.
17) B. K. Sahoo, "Role of microwave pre-treatment for coal and mineral beneficiation and rhelogical characterization", 2014.
18) Chhaya, "Processing of Stevia (S*tevia rebaudiana* Bertoni) Extract using Membrane Separation Technology", 2012.
19) J. Prakash, "Hydrodynamics and intraparticle nutrient transport inside porous pellets", 2010.
20) A. Maiti, "Removal of arsenic from water using raw and treated laterite as adsorbent", 2010.
21) D. Goswami, "Surfactant enhanced lipase catalyzed oil hydrolysis", 2010.
22) C. Prabhavathy, "Membrane based treatment of tannery effluent and flux enhancement techniques", 2010.
23) P. Banerjee, "Treatment of textile effluent by a combination of advanced oxidation process and nanofiltration", 2010.
24) B. Sarkar, "Electric field enhanced ultrafiltraion", 2008.
25) C.Das, "Treatment of tannery effluent and removal of pollutants using micellar enhanced ultrafiltration", 2008.
26) P. Rai, "Clarification of mosambi (*citrus sinensis (L.) osbeck*) juice using membrane technology", 2007.
27) M. K. Purkait, "Surfactant Mediated Separation Processes", 2005.

## Foreign Researcher Hosted:

- Mr. Sorel Sagu Techwampi from Cameroon under C V Raman Fellowship for African Researchers funded by FICCI-DST, Govt. of India, 2013.
- N. Kombele from Cameroon under Doctoral Fellowship for African Researchers funded by TWAS-DBT, Govt. of India, 2015.

- **Number of Ph. D students guided: *Twelve*** (under progress), ***Twenty seven*** (completed)
- **Number of M. Tech students guided: Seventy**
- **Number of M. S. (by research) students guided: *Two***
- **Number of B. Tech. students guided: *Sixty five***

## Chairing conference session:

- Chaired a session in workshop "The recent developments in microbial fuel cell and membrane bio-reactor", Feb. 2, 2018.
- Chaired a session in conference "Recent Trends in Membrane Separation Technology", Central Salt & Marine Research Institute, Bhavnagar, Nov. 23, 2017
- Chaired a session in conference by Indian Desalination Association on "Newer methods for solar desalination", Chennai, Feb 13, 2016.

- Chaired two sessions of international workshop "Hybrid membrane based separation processes for treatment of industrial wastewater", at IIT Kharagpur, April 1 & 2, 2014.
- Chaired a session of "Symposium of young engineer awardees and vision of S. S. Bhatnagar awardees" in "Engineering Science" group at Vigyan Bhawan, New Delhi, 26 Sep., 2012.
- Chaired a session of "Challenges of Chemical Engineering" in one day symposium held to felicitate Prof. Anil Kumar and Prof. Santosh Kumar Gupta at IIT Kanpur, May 7, 2012.
- Chaired a session of "Advanced Separation Processes" in 2nd Indo-German workshop for Advanced Separation and Reactive systems, Bad Harrenalb, Germany, Feb 22, 2012.
- Chaired session on "Process modeling and simulation", in CHEMCON-2010, Dec. 27-29, 2010, Annamalainagar, Tamilnadu, India.
- Chaired session on "Transport Processes and New separation Technologies", in 13th Asia Pacific Confederation of Chemical Engineers, Oct 5-8, 2010, Taipei, Taiwan.
- Chaired session on "separation processes" in CHWMINSIGHT 2010, 20-21 March, 2010, IIT Kharagpur
- Chaired the session on "Effluent treatment" in First Indo-Tunisian Workshop on Water Science and Technology, 20-26 Feb**.,** 2010, at Tunis, Tunisia.
- Chaired the session on "Membrane Separation Processes" in International Conference on Separation Processes, 20-22 Oct**.,** 2009, IT BHU, Varanasi.
- Chaired the session on "Novel Separation Processes" in National Conference on Frontiers in Chemical Engineering, 12-14 December 2007**,** IIT Guwahati.
- Chaired a session on "Separation processes" in 1st National Conference for Research Scholars and Young Scientists (CRSYS), IIT, Kharagpur, 25-27th September, 2004.
- Chaired a session on "Separation Technology" in Cheminsight-2006, IIT Kharagpur, October 16-17, 2006.
- Chaired a session on "Separation Technology" in Cheminsight-2005, IIT Kharagpur, September 12-13, 2005.

## Invited lectures delivered:

1) "Indigenous technologies from lab to field", Institute Lecture Series, NIT Raipur, March 26, 2022.
2) "Treatment technologies and conservation of groundwater", Bharat Chamber of Commerce, Kolkata on World Water Day, March 22, 2022.
3) "Innovative indigenous technologies from lab to field", (online) INUP i2i online Familiarization Workshop on Nanofabrication and Characterization, School of Nanoscience & Technology, IIT Kharagpur, February 10, 2022.
4) "Innovative indigenous technologies from lab to field", (online) Chem-e-Talks at Dwarkadas Jivandas Sangvi College of Engineering, Mumbai, March 21, 2021.
5) "Pressure driven membrane based processes: Present and future perspectives", (online) workshop on "Future of Chemical Engineering", IIT ISM Dhanbad, March 21, 2021.
6) "Innovative ultra low cost technology for removal of arsenic and fluoride from ground water", (online), InDa Conference, MNIT Jaipur, March 19, 2021.
7) "Indigenous Technologies: From Lab to field", (online) BITS Pilani, February 24, 2021.
8) "Innovative and indigenous technologies for water treatment", (online) invited lecture in India International Science Festival 2020 – water segment, organized by DST, Govt of India, December 24, 2020.

9) "Indigenous Technologies: From Lab to field", (online) IIT Roorkee, December 21, 2020.
10) "Indigenous Technologies: From Lab to field", (online) GGS Indraprastha University, May 17, 2020.
11) "Low cost hollow fibers and their applications", invited lecture in Advanced Polymer & Rubber Technologies, IIT Kharagpur, Sep 25, 2019.
12) "Indigenous Technologies: From Lab to field", BITS Goa, Sep 17, 2019.
13) "Laterite based low cost arsenic removal technology", invited lecture in International Workshop on Rural Water Quality and Management, IIT Kharagpur, May 14, 2019.
14) "Research trends, funding opportunities and quality of a good proposal", NIT Durgapur, Mar 19, 2019.
15) "Indigenous Technologies: From Lab to field", NIT Durgapur, Mar 18, 2019.
16) "Research trends, funding opportunities and quality of a good proposal: A Chemical Engineer's perspective", Inaugural lecture in Institute Lecture Series, IIT (ISM) Dhanbad, Mar 05, 2019.
17) "Low cost mixed matrix hollow fibers and their applications". CSMCRI, Bhavnagar, Feb 18, 2019.
18) "Indigenous Technologies :From Lab to field", IIT (ISM) Dhanbad, Jan 14, 2019.
19) "Indigenous low cost treatment technologies for arsenic and fluoride: From laboratory to field scale", Key note lecture in workshop on Research conceptions, techniques and publication, VNIT Nagpur, Dec 20, 2018.
20) "Ultra-low cost spinning of hollow fibers and their applications", Key note lecture in workshop on Research conceptions, techniques and publication, VNIT Nagpur, Dec 20, 2018.
21) "Innovations in polymeric hollow fibers and their applications", Plenary lecture in Innovations in Materials Science and Technology (IMST 2018), Calcutta University, Dec. 14, 2018.
22) "Fundamentals and applications of membrane separation processes in wastewater treatment", TEQUIP course on Waste Water Treatment Technologies, School of Environmental Science & Engineering, IIT Kharagpur, November 22, 2018.
23) "Arsenic removal from groundwater using laterite: From lab to field", in Academia-Industry Meet 2018, S N Bose National Center for Basic Sciences, Kolkata, October 6, 2018.
24) "Innovation of hollow fiber membranes and their applications", CSIR National Metallurigcal Laboratory, Jamshedpur, August 14, 2018.
25) "Indigenous low cost water treatment technologies: From laboratory to field scale", CSIR Central Salt and Marine Research Institute, Bhavnagar, July 19, 2018.
26) "Ultra-low cost spinning of hollow fibers and their applications", CSIR Central Salt and Marine Research Institute, Bhavnagar, July 19, 2018.
27) "Innovative & indigenous technology: from laboratory to the field", in CHEMFERENCE, IIT Bombay, June 19, 2018.
28) "Innovative & indigenous technology: from laboratory to the field", in INAE YOUTH Pre-CONCLAVE, IIT Kharagpur, March 24, 2018.
29) "Innovative & indigenous technology: from laboratory to the field", in REFLUX 2018, Chemical Engineering Department, IIT Guwahati, March 16, 2018.
30) "A facile way to diagnosis of diseased state by mass transport across porous wall of a microtube", in workshop NWNTD 2018 at IIT Guwahati, Feb 28, 2018.

31) "Ultra low cost hollow fibers and their applications", in workshop "The recent developments in microbial fuel cell and membrane bio-reactor", Feb. 2, 2018.
32) "Ültra low cost laterite based arsenic filter", Chemcon 2017, Haldia Institute of Technology, Dec 30, 2017.
33) "Mass transport across porous wall of a microtube: A facile way to diagnosis of diseased state", TOPAS, 2017, A National Conference on Engineering Mathematics, IIT Kharagpur, Dec 17, 2017.
34) "Ultra low cost spinning of hollow fibers and their applications", Recent Trends in Membrane Separation Technology, Central Salt & Marine Research Institute, Bhavnagar, Nov. 23, 2017.
35) "Indigenous technologies: from laboratory to the field", Department of Chemical Engineering, NIT Karnataka, Oct 12, 2017.
36) "Challenges in Arsenic removal gravity driven filters", Indo-UK workshop, Department of Chemical Engineering, IIT Kharagpur, Sep 12, 2017.
37) "Innovations in hollow fiber spinning and applications", Department of Mathematics, Oxford University, London, May 22, 2017.
38) "Ultra low cost laterite based filter for arsenic removal", Department of Mathematics, Oxford University, London, May 22, 2017.
39) "Innovations and translational research", invited talk in Inclusive Manufacturing Forum, National Institute of Advanced Science, Bangalore, April 7, 2017.
40) "Innovative Technologies", invited talk in DST-INSPIRE workshop at KIITS Bhubaneswar, Dec. 16, 2016.
41) "Zero discharge plant using membrane technology", invited talk in workshop on Sustainable zero discharge plant, NIT Durgapur, Oct 3, 2016.
42) "Proficiency enhancement in science laboratory courses in open distance learning", invited talk, Netaji Subhas Open University, Sep 29, 2016.
43) "Market driven innovations from research: Some examples", invited talk in VNIT, Nagpur, Sep 4, 2016.
44) "Applications of hollow fiber membranes for wastewater treatment", invited talk in workshop organized on Advances in Wastewater Treatment in NIT Durgapur, July 08, 2016.
45) "Recent innovations in wastewater treatment", invited talk to workshop organized on Recent Advances in Wastewater Treatment in Jadavpur University, June 13.
46) "Innovations for arsenic removal from ground water and hollow fibers for industrial waste water treatment", keynote lecture at IIT Guwahati, June 4, 2016.
47) "Fundamentals and applications of membranes for wastewater treatment", invited talk in workshop on Wastewater treatment and Energy generation, IIEST Shibpur, May 26, 2016.
48) "Fundamentals and applications of membrane processes", invited talk at KIITS, Bhubaneswar, Mar 12, 2016.
49) "Indigenous development of membrane and their applications", invited talk at SRM University, Chennai, Feb 15, 2016.
50) "Laterite based arsenic removal technology", Workshop on Resources and supply of clean drinking water, IIT Kharagpur, Feb 6, 2016.
51) "Ultra low cost spinning of hollow fibers and their applications", CHEMCON 2015, Dec 28, 2015, IIT Guwahati.
52) "Laterite based low cost arsenic filter", invited lecture at Midnapore College, Sep 30, 2015.

53) "Membrane separation processes: Fundamentals & Applications", invited lecture at Biswabharati University, Shantiniketan in DST INSPIRE Camp, Sep 14, 2015.
54) "Indigenous technology for membrane casting and arsenic removal", invited lecture at NIT Karnataka, 27.08.2015
55) "Membrane casting and arsenic removal: Indigenous Technology", invited lecture at IIT Hyderabad, 26.08.2015.
56) "Membrane Separations: Fundamentals and Applications", invited lecture at Workshop on Advance Technologies for Industrial Wastewater Treatment, Tata Steel, April 27, 2015.
57) "Hierarchical modeling of pressure driven membrane based processes", invited lecture at Department of Mathematics, IIT Kharagpur, Mar 14, 2015.
58) "Indigenous technology casting, spinning and applications of hollow fiver membranes" , invited lecture at Department of Chemical Engineering, IIT Guwahati, Mar 9, 2015.
59) "Fundamentals and applications of membrane separation processes", invited lecture to INSPIRE program at KIITS, Bhubaneswar, Jan 31, 2015.
60) "Laterite based arsenic filter" invited lecture in 2 days international seminar on "Challenging issues related to groundwater in 2015" at Baharampur, Dec 29, 2014.
61) "New Developments in Membrane Technologies" invited lecture in Department of Chemical Engineering, ISM Dhanbad, Sep. 10, 2014.
62) "Hierarchical modeling in pressure driven membrane separation processes", invited lecture in Department of Chemical Engineering, Heritage Institute of Technology, Kolkata, Aug. 14, 2014.
63) "Scope of innovation and entrepreneurship in membrane technology", invited lecture in Department of Biotechnology, IIT Kharagpur, July 7, 2014.
64) "Treatment of industrial wastewater using membrane separation processes", expert lecture in workshop Pollution control of industrial waste water and production of value added product, at NIT Dugapur, June 30, 2014.
65) "Functional polymeric membranes: Flast sheet and hollow fibers", Keynote lecture in international workshop "Hybrid membrane based separation processes for treatment of industrial wastewater", at IIT Kharagpur, April 1 & 2, 2014.
66) "Modeling approaches of pressure driven membrane processes", Keynote lecture in Mass transfer session of ISHMT conference, IIT Kharagpur, Dec. 31, 2013.
67) "How to functionalize membranes?", CSMCRI CHEMCON Distinguished Lecture Award, CHEMCON, ICT Mumbai, Dec. 29, 2013.
68) "Hierarchical modeling of pressure driven membrane processes", invited lecture at ISTAM, Dec. 21, Bengal Engineering & Science College, Shibpur, 2013.
69) "Functional polymeric membranes and their applications", NASI-Reliance Industrial Award lecture, Conference on "Space in human life" at 83$^{rd}$ NASI conference at Goa, Dec 7, 2013.
70) "Polymeric Membranes: Tailor-made casting and their applications" invited talk to R&D Tata Steel, Jamshedpur, Nov. 15, 2013.
71) "Polymeric membranes and their applications", invited talk in AICTE sponsored short term course on "Materials for advanced applications", Material Science Center, IIT Kharagpur, Sep 12, 2013.
72) "Low cost laterite based arsenic mitigation", invited talk in One Day Symposium on Science and Society Organized by INSA Local Chapter, Kharagpur, Sep 12, 2013. "Casting of membranes and its applications", invited talk in KIIT, Bhubaneswar, Jun. 28, 2013.

73) "Laterite based arsenic filters and their performance", invited talk in KIIT, Bhubaneswar, Jun. 28, 2013.
74) "Low cost laterite based arsenic filter at community scale", invited talk at one day workshop on "Low cost community based arsenic filter", organized by IIT Kharagpur in collaboration with UNICEF, Jun. 22, 2013.
75) "Casting and spinning of polymeric membranes and their applications", invited talk in Department of Chemical Engineering, IISC Bangalore, March 28, 2013.
76) "Treatment of textile and tannery effluent using membrane separation processes", National Workshop on Applications of different techniques for waste water management, College of Engineering & Management, Kolaghat, March 24, 2013.
77) "Casting of polymeric membranes and their applications", keynote lecture in National conference of green Chemistry, VNIT, Nagpur, March 22, 2013.
78) "Functional membranes and their applications", invited lecture at Colloquium on frontier areas of research in Engineering & Science, organized by Department of Science & Technology, Govt. of Kerala in Rajiv Gandhi Institute of Technology, Kottayam, Mar 9, 2013.
79) "Casting and spinning of polymeric membranes with applications and laterite based arsenic filter", DST INSPIRE Lecture, in National Institute of Science & Technology, Behrampur, Orissa, Jan 24, 2013.
80) "Functional polymeric membranes and their applications", Silver jubilee lecture in Materia;s Science section, Indian Science Congress, Jan 4, 2013.
81) "Low cost laterite based arsenic filter at community scale", invited talk at one day workshop on "Low cost community based arsenic filter", organized by IIT Kharagpur in collaboration with UNICEF, Dec. 28, 2012.
82) "Polymeric membrane casting and applications", invited talk at one day workshop on "Gas and liquid separation by membranes", Central Glass & Ceramic Research Institute, Kolkata, Dec. 27, 2012.
83) "Membrane synthesis, application and novel technology for arsenic removal", invited talk at Materials Science Department, IIT Kharagpur, Nov.5, 2012.
84) "Innovative technology for membrane casting, applications and arsenic removal", invited talk, Nov. 8, 2012, IICT, Hyderabad.
85) "Fluoride removal by cellulose acetate-alumina mixed matrix membrane", invited talk in European Union-India Science & Technology Cooperation Days, Nov. 9, NGRI, Hyderabad.
86) "Technology innovations: Membrane casting, applications and arsenic removal from groundwater", C. V. Seshadri lecture, IIT Kanpur, Oct. 4, 2012.
87) "Indigenous technology for membrane casting, spinning and arsenic removal", invited talk in KIIT, Bhubaneswar, Sep. 18, 2012.
88) "Synthesis and traits of an Engineering Doctoral Thesis: A tutorial", invited talk on Research Scholar Day, Department of Chemical Engineering, IIT Kharagpur, June 22, 2012.
89) "Casting and spinning of polymeric membranes and their applications", invited talk, Institute of Chemical Technology, Mumbai, June 11, 2012.
90) "Modeling of pressure driven membrane separation processes", invited talk, Institute of Chemical Technology, Mumbai, June 12, 2012.

91) "Development of low cost arsenic filter", invited talk, Institute of Chemical Technology, Mumbai, June 13, 2012.
92) "Synthesis of a PhD thesis/report/research paper: A tutorial", invited talk, Institute of Chemical Technology, Mumbai, June 14, 2012.
93) "Polymeric membranes: Tailor-made casting and their applications", K C Khilar Memorial Lecture, IIT Bombay, April 16, 2012.
94) "Modeling approaches of pressure driven membrane separation processes", invited talk in Department of Chemical Engineering, IIT Bombay, April 17, 2012.
95) "Development of low cost arsenic filter", invited talk in Department of Chemical Engineering, IIT Bombay, April 17, 2012.
96) "Tailor made membranes and their applications", invited talk in Materials Science Center, IIT Kharagpur, April 04, 2012
97) "Performance of low cost filter for arsenic removal", invited talk in Rural Technology Action Group-Eastern India workshop, IIT Kharagpur, March 20, 2012.
98) "Indigenously developed polymeric membranes and their applications", invited talk in symposium of Separation Process in Gaytrai Vidya Parishad College of Engineering College, Vizag, on March 15, 2012.
99) "Innovative Applications of Polymeric membranes", invited talk in CHEMBRIDGE 2012 in the session of "Advanced Membrane Separation Processes", March 3, 2012, Jadavpur University.
100) "Electric field enhanced ultrafiltration and applications", invited talk in 2nd Indo-German workshop for Advanced Separation and Reactive systems, Bad Harrenalb, Germany, Feb 22, 2012.
101) "Innovative technology for polymeric membranes and arsenic free drinking water", felicitation lecture presented at IIT Kharagpur, Feb. 15, 2012.
102) "Application of membrane processes in wastewater treatment", invited talk in 2nd Indo-Tunisian Workshop, in NGRI, Hyderabad, Feb 2-5, 2012.
103) "Polymeric membranes: Casting and applications", Keynote lecture delivered at National conference on Recent Advances in Chemical and Environmental Engineering at NIT Rourkela, Jan 20, 2012.
104) "Emerging technologies in treatment of drinking and industrial waste water", lecture delivered in Joint workshop of University of California, Berkeley and IIT Kharagpur at IIT Kharagpur, 10.01.2012.
105) "Casting of polymeric membranes and a low cost arsenic removal technology from drinking water", lecture delivered in INSPIRE program organized by VisvaBharati University, Shantiniketan, Dec. 15, 2011.
106) "Casting of polymeric membranes and their applications", Symposium on "Frontier areas of polymers", organized by Department of Chemistry, Center of Rubber Technology and Center of Materials Science, IIT Kharagpur, Nov. 30, 2011.
107) "Design and performance of laterite based arsenic filter for domestic usage', One day Indo-German Workshop organized by Helmholtz Center of Research, Germany, Nov. 07, 2011.
108) "Low cost arsenic removal technology", Arsenic Task Force, Govt. of West Bengal, Kolkata, Sep. 15, 2011.
109) "Pore blocking models in membrane separations", Indo-UK workshop on Wastewater treatment in NIT, Trichy, August 29-31, 2011.

110) "Overview of research activities in membrane separation laboratory", Central Glass and Ceramic Research Institute, Kolkata, May 16, 2011.

111) "Membrane research at IIT Kharagpur", Indo-Canadian workshop in Kolkata, Jan 21-23, 2011.

112) "Modeling approaches of Membrane Based Separation Processes", Herdillia award lecture in CHEMCON 2010, Dec. 26-29, 2010, Annamalainagar, Tamilnadu.

113) "Industrial waste water treatment: Use of membrane based processes", in AICTE short term course on Solids and Hazardous Waste Management, Nov. 12-15, 2010, IIT Kharagpur.

114) "Extraction and clarification of stevioside using membrane separation processes", in 13$^{th}$ Asia Pacific Confederation of Chemical Engineers, Oct 5-8, 2010, Taipei, Taiwan.

115) "How to write a reasonable PhD thesis", Special Guest lecture in HSS course "English for technical writings", IIT Kharagpur, September 28, 2010.

116) "Modeling of pore blocking during cross flow membrane filtration", Department of Mechanical Engineering, University of Alberta, Canada, July 2, 2010.

117) "Research trends in membrane separation laboratory at IIT Kharagpur", Seimens IT Solutions and Services, Bangalore, Jun. 14, 2010.

118) "Membrane based separation processes: Fundamentals and Applications", in One-day colloquium on Science and Technology of advanced materials, Gunupur Institute of Engineering & Technology, Gunupur, Orissa, Feb. 7, 2010.

119) "Flux enhancement techniques during membrane based processes", in First Indo-Tunisian Workshop Water Science and Technology, 23 Feb.**,** 2010, at Tunis, Tunisia.

120) "Polymeric membranes for treatment of industrial waste water" in the International workshop "'Advances in Membrane Technology for Water Treatment, Environment and Clean Energy" organized by Central Glass & Ceramic Research Institute, Kolkata, 7-8 December, 2009.

121) "Applications of membrane separation processes for industrial pollution control", in the short term course titled "Waste minimization and Bio-energy recovery" organized by Department of Civil Engineering, IIT Kharagpur, 24-26 Nov., 2009.

122) "Water extraction of polyphenols from green tea leaves", in International Society of Antioxidants in Nutrition and Health (ISANH) and Malta Antioxidants 2009, Oct. 29-30, 2009, Malta.

123) "Modeling of membrane Separation processes", ITBHU, October 20, 2009, International Conference on Separation Processes, Invited lecture.

124) "Membrane based technology: Fundamentals and typical applications", Department of Mechanical Engineering, University of Alberta, Canada, July 15, 2009.

125) "Fundamentals and modeling of Membrane based processes", Expert lecture in Workshop on Membrane Separation Processes, in Jawaharlal Nehru Technical University, Anantapur, on 31.3.2009.

126) "Membrane based separation technology - some case studies", Guest lecture in symposium organized by Confederation of Indian Industries, at Tata Bearings, Kharagpur on 17.2.2009.

127) "Micellar enhanced ultrafiltration and arsenic removal", Jadavpur University, Dec. 09, 2008.

128) "Membrane applications in industries", Jadavpur University, Dec. 08, 2008.

129) "Zero discharge plant: Treatment of tannery effluent using membrane separation processes", Invited lecture to International Conference on Zero Discharge Plant, Institution of Engineers India, Dec. 22, 2007, Kolkata.

130) "Industrial Applications of Membrane Separation Processes", lecture delivered to QIP short term course at Chemical Engineering Department, IIT Guwahati, Dec., 13, 2007.

131) "Desalination", lecture delivered to QIP short term course at Chemical Engineering Department, IIT Guwahati, Dec., 13, 2007.

132) "Application of membrane technology", keynote lecture to Haldia Institute of Technolgy on 26.3.2007

133) "Membrane Technology", expert lecture to JNTU, Anantapur on 24.2.2007.

134) "Clarification of fruit juice using membrane filtration" invited lecture at IIT Kanpur, August, 2005.

135) "Modeling and applications of Membrane processes", invited lecture at IIT Kanpur, April,
2003.

136) ***"Modeling and simulation of Membrane separation processes"*** delivered for the workshop on "The Membrane Separation Processes" organized by Chemical Engineering Department, Jadavpur University from 2-18 July, 2001.

137) ***"Modeling of the cross flow membrane separation processes''*** delivered for the course on **"Current trends in process modeling based on heat, mass , momentum transfer and chemical kinetics"** organized by Chemical engineering department, IIT Kharagpur from Jan. 10-14, 2000.

138) ***"Chemical and allied small scale industries: Membrane based technology and Non-conventional sources of energy"*** delivered for the course **Management concepts and technologies for the small scale industries** organized by Vinod Gupta school of management, IIT Kharagpur, from Feb 28 – Mar. 3, 2000.

## Workshops/conference organized

1. "Low cost laterite based arsenic filter at community scale", one-day workshop at Kolkata center of IIT Kharagpur in collaboration with UNICEF, Dec. 28, 2012.
2. "Low cost fluoride and arsenic filter at community scale", one-day workshop organized by at Malda district in collaboration with UNICEF and Indian Institute of Engineering Science & Technology, Jun. 22, 2015.
3. "Forecasting contaminant percolation through soil beds in India", one day workshop at IIT Kharagpur in collaboration with Mathematical Institute, University of Oxford, UK, September 12, 2017.

## Foreign Visits:

1) To participate Indo-UK workshop at Oxford University on Percolation of pollutant through soil bed, Oxford, May 22-May 26, 2017.
2) To participate 2nd Indo-German workshop for Advanced Separation and Reactive systems, Bad Harrenalb, Germany, Feb 22, 2012.
3) To **chair a session** on "Transport Processes and Novel separation Technologies", in 13th Asia Pacific Confederation of Chemical Engineers, Oct 5-8, 2010, Taipei, Taiwan
4) As **Visiting Professor to** Department of Mechanical Engineering, University of Alberta, Canada, from June 3 to July 17, 2010
5) **Invited speaker** in First Indo-Tunisian Workshop on Water Science and Technology, 20-26 Feb.**,** 2010, at Tunis, Tunisia.
6) As **Technical Expert and invited speaker** in International Society of Antioxidants in Nutrition and Health (ISANH) and Malta Antioxidants 2009, Oct. 29-30, 2009, Malta.
7) As **Visiting Researcher to** Department of Mechanical Engineering, University of Alberta, Canada, from July1 to July 23, 2009.

## Consultant to the industries:

1. M/s, Mondal Precisions Pvt. Ltd., Howrah.
2. M/s, VAS BROS Enterprises Pvt. Ltd., Ranchi.
3. M/s, Phyto Biotech Pvt Ltd., Kolkata.
4. M/s, Forus Health Pvt. Ltd., Bangalore
5. M/s, ADN Distillaries Pvt. Ltd., Kharagpur.
6. M/s, Ecoyeth Vision, Kharagpur.
7. M/s, Technorbital, Pune.
8. M/s, Technovita Bioscience Pvt. Ltd.

## Expert Committee Member:

- Member, Task Force Committee of Empowerment and Equity Opportunities for Excellence in Science, SERB, Department of Science & Technology, Govt. of India, 2022.
- Expert in Technical Sub Committee "C&D Waste and Plastic Waste Management", Waste to Wealth Mission, Office of Principal Scientific Adviser, Govt of India, 2022.
- Expert in Technical Sub Committee "MSW, Landfill reclamation and E-Waste", Waste to Wealth Mission, Office of Principal Scientific Adviser, Govt of India, 2022.
- Expert member in Engineering Science in selection committee of Swarnajayanti Fellowship, 2021.
- Chairman of committee on special call of Innovation and critical components of oxygen generator for COVID patients, SERB, DST, 2021.
- PAC member for Chemical and Environmental Engineering, SERB, Department of Science & Technology, Govt. of India, 2021-2024.
- Chairman in Technology Development Stream of Water Technology Initiative, Department of Science & Technology, Govt of India, 2019-2021.
- Domain Expert in "Deployment of Water Technologies", CSIR, Govt. of India, 2019.
- Expert member for Travel grant schemes of Indian National Academy of Engineering, 2018-2020.

- PAC member for Chemical and Environmental Engineering, Department of Science & Technology, Govt. of India, 2018-2021.
- Expert member in Sectional Committee X (Interdisciplinary Engineering) for selection of Fellow, Indian National Academy of Engineering, 2018-2020.
- Expert member constituted by National Green Tribunal, West Bengal, 2016 on arsenic mitigation.
- PAC member for Chemical and Environmental Engineering, Department of Science & Technology, Govt. of India, 2015-2017.
- Expert in Curricular Restructure Committee, ISM Dhanbad, 2015.
- Expert in Research Council Committee, IIT Kharagpur, 2015
- Expert in Faculty selection committee, Calcutta University, 2015.
- Expert in Faculty selection committee, Vidyasagar University, 2015.
- Expert in Faculty selection committee, ICT Mumbai, 2015.
- Expert in Faculty selection committee, IIT Guwahati, 2014.
- Expert in Faculty selection committee, IIT Roorkee, 2014.
- Expert in Faculty selection committee, NIT Rourkel, 2013.
- Expert in Faculty selection committee, Jadavpur University, 2013.
- President's visitor nominee for selection of faculty position in NITs appointed by Ministry of Human Research & Development for 2013-2015.
- Expert member in Faculty selection committee in Chemical Engineering Department of Jadavpur University, 2012.
- Expert committee member for faculty selection in Indira Gandhi Institute of Technology, Dhenkanal, Orissa, 2010.
- Expert committee member for faculty selection in Jharkhand Public Service Commission (JSPC), 2009.

**New Product Development**

**Development of product of academic/Industrial interest:**

**(1) A low cost hollow fiber membrane spinning unit**

**(2) Complete table top set up of hollow fiber membrane module.**

This set up is used to conduct UG laboratory or research works. This set up is supplied to various institutes and research laboratories. Supplied to: (i)Andhra Pradesh Horticulture University, Pandirimamidi (Rajamundry); (ii) H. R. Engineering, Kolkata; (iii) D Y V Patil University, Kolhapur; (iv) Department of Chemical Engineering, National Institute of Technology, Rourkela; (v) Chemical Engineering, Jadavpur University, Kolkata; (vi)Department of Biotechnology, IIT Kharagpur; (vii)Department of Agriculture and Food Science Technology, IIT Kharagpur; (viii)Chemical Engineering Department, S. V. National Institute of Technology, Surat; (ix)Central Glass & Ceramic Research Institute, Kolkata; (x)Department Chemical Engineering, Visveswaraya National Institute of Technology, Nagpur; (xi)Department of Civil Engineering, Indian Institute of Technology Roorke; (xii)Department of Chemical Engineering, National Institute of Technology Raipur; (xiii)Department of Chemistry, IIT (BHU), Varanasi; (xiv)College of Agricultural Engineering, Acharya N.G. Ranga Agricultural University, Bapatla; (xv)National Advanced School of Agro-Industrial Sciences, University of Ngaoundere, Cameroon; (xvi)Department of Chemical Engineering, GGS Indraprastha University, New Delhi; (xvii)Department of Chemical Engineering, IIT (BHU), Varanasi; (xviii)College of Food Science & Technology, Acharya N.G. Ranga Agricultural University, Bapatla; (xix)Environment Research Group, R&D and Scientific Services Dept., Tata Steel, Jamshedpur; (xx)Mahatma Gandhi Mission College of Engineering & Technology, Navi Mumbai; (xxi)University College of Technology, Osmania Univresity, Hydrabad; (xxii)Institute of Chemical Technology, Mumbai; (xxiii)Department of Petroleum Technology, Dibrugarh University, Dibrugarh; (xxiv)Dept. of Food and Agricultural Process Engineering, Agricultural Engineering College and Research Institute, Tamil Nadu Agricultural University, Coimbatore.

**Design of product for industrial interest:**

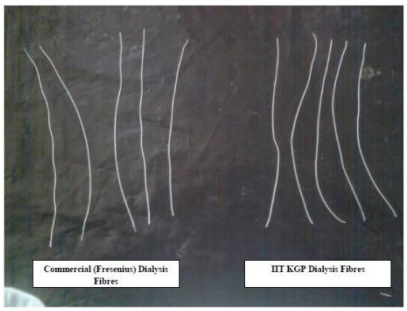
**(1) Design of pilot scale nanfiltration and ultrafiltration units**

These pilot scale ultrafiltration and nanofiltration units are designed, fabricated and installed by Prof. De and his group in the pilot plant of M/s, PhytoBiotech Pvt. Ltd., Kolkata, where commercial production has started.

**(2) Design of pilot unit for ceramic membrane filtration**

The pilot scale ceramic membrane filtration unit is designed, fabricated and supplied to Central Glass and Ceramic Research Institute, Kolkata.

**(3) Dialysis hollow fibers for the first time in India using an indigenous technique without spinneret**




The fibers have internal diameter of 220 micron with wall thickness 35 micron. The left fibers are commercial fibers (Fresenius) and right fibers are developed in our laboratory.

Prototype hemodialysis cartridge. The front one is cartridge made in our lab (Rs. 300) and the rear one is commercial Fresenius cartridge (Rs. 1500).

**(4) 5000 l/h capacity chloride removal plant designed for Tata Steel, Haldia site with chloride selective membrane developed by Prof. De's lab.**

**(5) Rice mill effluent treatment unit (10000 L/day), Sreema Rice Mill, Hoogly, West Bengal**

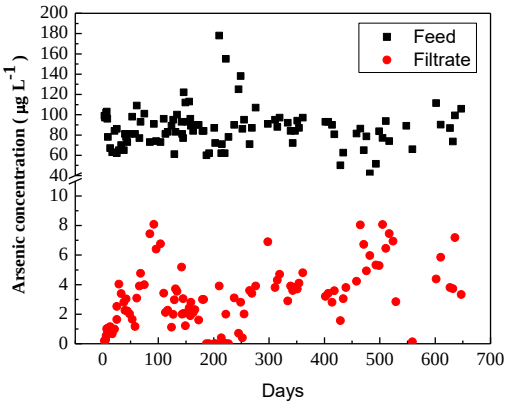
**Development of product of for rural India:**

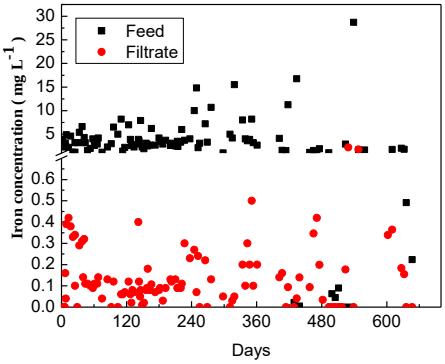
**(1) Community scale arsenic filter (500 liter/day) at Kashinathpur Free Primary School, Rajarhat, North 24 Pargans ( Funded by UNICEF project)**

Arsenic filter (1500 liter/day) at Ambika Girls' High School, Rajarhat, North 24 Parganas **(Funded by DST)**

**(2) Domestic scale laterite based filter (100 liter/day capacity) (25 such filters are deployed, funded by DST project)**


These domestic filters are deployed in Barasat, West Bengal




Performance of arsenic (left) and iron (right) removal for 650 days are shown above. Arsenic concentration is reduced from about 200 µg/l to less than 10 µg/l. Iron concentration is reduced from 5-15 mg/l to less than 0.3 mg/l.

**Community filters (2000 l/h) in Nadia and North 24 Parganas**

**Community filters (2000 l/h capacity) in Nadia and North 24 Parganas**

## (3) Filter for Fluoride removal using mineral rich carbon

500 L/day capacity in Baxutuli Primary School, Bankura

Laladhar Primary School (2000 L/h), Bankura

Domestic Fluoride removal unit (40 L/day), Bankura

## Spin-off Company

Established a company under Science & Technology Entrepreneurs' Park, IIT Kharagpur in 2012 named **M/s, Technoquips Separation Pvt. Ltd** (Corporate Identification Number (CIN) is U29253WB2012PTC182829 and Registeration Number is 182829); **Web address: http://www.sirshendudelab.in/Startup.php; E-mail: contact@technoquips.com.** This company involves in supplying activated laterite based arsenic filters (domestic and community scale), membrane separation units, like, batch and cross flow filtration cell, hollow fiber set up, flat and hollow fiber cartridges of microfiltration, ultrafiltration and nanofiltration of various molecular weight cut off. Its clients include various institutes and research organizations in India and abroad and also common people (for arsenic filters). **The turn over of this company in 2021-2022 financial year is Rs. 18 lakhs**.

## Research Analysis (Source: Google Scholar)

**Total number of publications:342**
**Total number of citations received between 1996-2021: 12327**
**H-index:58**

## List of publications (in press/published):

1) S. Sahachowdhury, B. Bera, S. De, "Adsorptive remediation of aqueous inorganic mercury with surfactant enhanced bismuth sulfide nanoparticles", accepted in **Environmental Research.**
2) A. Das, A. Jana, D. Das, S. Biswas, H. Sheshadri, **S. De,** "Surfactant assisted 3-Aminopropyl triethoxysilane (APTES) functionalization of graphene oxide intercalated Layered double hydroxide (LDH) for uranium adsorption from alkaline leach liquor", accepted in **Journal of Cleaner Production**.
3) P. Sarkar, D. Roy, S. Neogi, **S. De**, "Activation of Peroxymonosulfate by S-scheme Bi2S3/doped gCN heterostructure photocatalyst for highly efficient visible light driven Tetracycline degradation: insights into reaction mechanisms", accepted in **Separation & Purification Technology**.
4) S. Misra, A. M. A. Ikbal, D. Bhattacharjee, M. Hore, S. Mishra, S. Karmakar, A. Ghosh, R. S. Srinivas, A. Das, S. Agarwal, K. Das Saha, P. Bhardwaj, I. B. Ubhadia, P. Ghosh, **S. De**, O. N. Tiwari, D. Chattopadhyay, P. Palit, "Validation of Antioxidant, Antiproliferative and in-vitro Anti-Rheumatoid Arthritis activities of Epigallo-catechin rich bio-active fraction from Camellia sinensis var. assamica, Assam variety White Tea and its comparative evaluation with Green-tea fraction", accepted in **Journal of Food Biochemistry.**
5) C. Panigrahi, S. S. Ravuru, H. N. Mishra, **S. De**, "Antimicrobial and antifouling performance of modified membrane during UF of sugarcane juice", accepted in **Journal of Food Engineering**.
6) S. Sinha, D. Roy, S. Sengupta, S. Neogi, **S. De**, ""Froth flotation as primary treatment of flowback water: removal of total organic carbon and prediction of kinetics", accepted in **The Canadian Journal of Chemical Engineering**.
7) S. Mondal, S. Bhattacharjee, **S. De**, "Electro-kinetically enhanced mass transport of charged macro-solutes through a microchannel with porous walls", accepted in **AIChE Journal**.
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## Publications in Proceedings/conferences

### *International conferences:*

1. S. Chatterjee, **S. De**. Treated laterite as potential adsorbent for removal of heavy metals from drinking water. ACS 254th National Meeting, Washington DC, USA, 2017.
2. M. Mondal, **S. De**, Treatment of textile plant effluent by hollow fiber nanofiltration membrane and multi-component steady state modeling" International Workshop under "Forecasting contaminant percolation through soil beds in India" held at Mathematical Institute, Oxford University, UK, on May 2017.
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4. M. Mondal, S. De, Removal of congo red dye using magnetic nickel–iron oxide (NFO) nanoparticle incorporated polysulfone (PSF) mixed matrix ultrafiltration hollow fiber membrane , 9th International Membrane Science and Technology Conference (IMSTEC), December 2016, Adelaide, Australia.
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45. S. Chakraborty, S. De, S. DasGupta and J. K. Basu, “Studies on adsorption of crystal violet and methylene blue from aqueous solutions using low cost adsorbent”, presented in Chemcon-2002, Hyderabad, India( 2002).
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50. S. Anand, S. De and S. DasGupta, “An investigation of cooling and axial dry out for evaporation from V-shaped microgrooves”, presented in Chemcon 1999, Chandigarh.
51. V. Karthik, S. DasGupta, S. De, “Modeling and simulation of osmotic pressure controlled cross flow electroultrafiltration” presented in Chemcon 1999, Chandigarh.
52. P. K. Bhattacharya, S. Agrawal, S. De, A. D. Sarode and U. V. S. Ramagopal, "Flux and retention analysis for ultrafiltration of sugar cane juice for the recovery of sugar", presented in Chemcon-98, Vizag, India( 1998).

53. V.S. Minnikanti, S. DasGupta, S. De, "Mass transfer with suction for turbulent flow in cross flow ultrafiltration", presented in Chemcon-98, Vizag, India( 1998).
54. S. De, "Green's functions: Applications in heat transfer with a variable source/sink", presented in 12th convention of Mechanical Engineers by The Institute of Engineers (India), Allhabad, India (1997), in the annual paper meeting.
55. S. De and P. K. Bhattacharya, "Studies on cross flow ultrafiltration using high rejecting membrane", 46th annual conference of IIChE, CHEMCON-93, Bombay, India (1993).

## Projects handled:

### *Completed Projects:*

1. "Removal of organic and inorganic pollutants from aqueous stream using micellar enhanced ultrafiltration", ISIRD project sponsored by IIT Kharagpur, 1999-2000, 1.0 lakh.

2. "Removal of toxic dyes from industrial effluent using a combination of adsorption and membrane separations", sponsored by MHRD, 2001-2003, 8.0 lakh.

3. "Online decision making, property prediction and optimization of petrochemical/natural gas plants using real-time models"; sponsored by Gas Authority of India Ltd, U.P. Petrochemical Complex, Pata, 2002-2004, 22.0 lakh.

4. "Treatment of leather plant effluent using membrane based separation processes", Mission Project under Manufacturing and System Engineering, IIT Kharagpur, 2003-2004, 1.0 lakh.

**5.** "Development of micro grooved heat pipes: Performance modeling and experimental validation", sponsored by Bhaba Atomic Research Center, Mumbai, 2001-2004, 10.0 lakh.

**6.** "Use of turbulence to enhance flux during membrane separation of toxic dyes from waste water", sponsored by CSIR, 2002-2004, 9.0 lakh.

7. "Computational fluid dynamics modeling and flow visualization of a gas liquid mixture through a nozzle and subsequent spray", sponsored by MHRD, 2003-2005, 8.0 lakh.
8. "Micellar enhanced ultrafiltration for removal of organic and inorganic pollutants from aqueous streams", Fast track project from DST, 2004-2006, 8.3 lakh.
9. "Surfactant based separation processes to treat the industrial effluent", sponsored by MHRD, 2005-2007, 13.0 lakh
10. "Strategy of pollution control in Rourkela Steel Plant", sponsored by Rourkela Steel Plant, 8.5 lakhs, 2007.
11. "A study of microscale transport processes leading to the development of a cooling strategy for electronic components", sponsored by DIT, 2007-10, 89 lakhs.

12. “Removal of radioactive iodine from urine of thyroid cancer patients”, sponsored by IIT Kharagpur, 1.0 lakhs, 2008.
13. “Flux enhancement and fouling reduction during effluent (leather & dye) treatment using membrane separation”, sponsored by DST, 2006-2008, 22.0 lakh.
14. “Set up of polyphenol plant from extract of green tea leaves”, Rangpur Tea Association Ltd., Alipurduar, 2008.
15. “Indo-Canada joint PDA on Nanoscale process for clean coal and bioinspired water & GHG efficient energy technologies”, sponsored by DST, 2010 (Jan 21-23) – 8 lakhs.
16. Optimization, characterization and casting of hemodialysis membranes, sponsored by M/s, Forus Health Pvt. Ltd.., 2009-2011, 22.3 lakhs.
17. Development of low cost household filter for arsenic and other pollutant-free drinking water using modified laterite, sponsored by DST, 2008-2011, 20.4 lakhs.
18. “Modeling for upscaling capacity of ceramic membrane based wastewater treatment unit”, sponsored by CGCRI, 2011-2012, 5.91 lakhs.
19. “Field trial of low cost laterite based arsenic filter: Domestic and community scale”, sponsored by DST, 2012-2013, 20 lakhs.
20. “Processing of tender coconut water using membrane processes”, Technoeagles Pvt. Ltd., 2012-2013, 10 lakhs.
21. “Production of low cost hollow fiber hemodialysis cartridge”, sponsored by DST, 2012-2015, 35.7 lakhs.
22. “Modeling of magnesium reactor”, National Metallurgical Laboratories, 2012-2013, 8 lakhs.
23. “Tailor made nanofiltration membrane for selective removal of chloride ions from steel industry effluent”, Tata Steel, Jamshedpur, 2014-2015, 12 lakhs.
24. “Exploration, testing and supply of safe drinking ground water to school children of soladahar and balrampur village, West Medinipur ”, IIT Kharagpur, 2014-15, 1.0 lakh.
25. “Providing arsenic free safe drinking water in a primary school in Malda District of West Bengal, India through cost effective Laterite Based Filter in community scale”, UNICEF, 2014-2015, 17 lakhs.
26. “Development of magnesium metal production technology”, NML Jamshedpur, 2015-2016, 4 lakhs.
27. “Computer aided simulation of magnesium reactor”, NML Jamshedpur, 2016, 4 lakhs.
28. “Scale up of Chloride Removal by Tailor Made Ion Selective Membrane”, Tata Steel, 2016-2017,12 lakhs.
29. “Removal of cyanide from industrial wastewater”, Tata Steel, 2015-2017, 12 lakhs.
30. “Preparation, characterization and performance of functionalized membranes with improved anti-fouling properties”, DAE-BRNS, 2012-2017, 100 lakhs.
31. “Appraisall of DPR on Solid Waste Management for different Cities of Odisha”, Housing and Urban Development Department, Govt. of Odisha, 2016, 35 lakhs.
32. “To establish and prove workability of zero-discharge system”, Indeutsch Industries Private Limited, Noida, 2017-18, 6.26 lakhs.
33. “Setting up of an advanced membrane separation facility”, IIT Kharagpur, 2014-2019, 250 lakhs.
34. “Verification of Fluoride Removal Process from RO-Reject Water by Using Alumina”, Hindalco Industries Ltd., 2016-2018, 15 lakhs.

35. "Use of Chemically Treated Carbonized Bone Meal for Fluoride Mitigation from Drinking Water", DST, 2016-2019, 27 lakhs.
36. "Reclamation of coal washery process water using membranes", Tata Steel, Jamshedpur, 2018-19, 10.46 lakhs.
37. "Indigenously Prepared Low Cost Fluoride Removal Filter", DST Lockheed Martin Tata Trust IIGP University Challenge Grant, 2018-2019, 10.0 lakh.
38. "Characterization and Optimization of Polyacrylamide based Coagulants for Wastewater Treatment", Radik Chemicals Pvt. Ltd., 2019 (6 months), 3.96 lakhs.
39. Highly Efficient Aluminium Fumarate Metal Organic Framework (Mof) Based Polymeric Media For Fluoride Remediation From Groundwater, DST Lockheed Martin Tata Trust IIGP University Challenge Grant, 2019-2020, 10.0 lakh.
40. "Water Management During Hydrofracking Operations of Shale Gas Field", ONGC. 2016-21, 1.75 crores.
41. "In-situ photo-degradation of cyanide from steel effluent using functionalized graphene", Tata Steel, Jamshedpur, 2017-21, 13.56 lakhs.
42. "Low pressure nano-filtration for removal of monovalent and bivalent salts from leached liquor during alkaline uranium ore processing", Atomic Energy Regulatory Board, 2018-2022, 23.24 lakhs.
43. "Development of Processing Technology and Prototype Unit for Manufacture and Shelf Life Extension of Sugarcane Juice", Ministry of Food Processing Industries, 2019-2022, 53.9 lakhs.
44. Development of advanced membrane technologies to reduce tds and cod of viscose fiber effluent, Aditya Birla Science And Technology Company Private Limited, 2019-2020, 5.97 lakhs.
45. "Development of indigenous membrane cartridges for hemodialysis", Department of Science & Technology, 2018-2021, 5.26 lakhs.
46. "Vetting of the internal report on Durgapur Chemicals submitted to the Department of PE & IR for restarting of caustic chlorine and allied downstream plants at Durgapur, West Bengal", Jan – Feb., 2022, 7.67 lakhs.

***Foreign Collaborative Projects:***

47. "Flux enhancement using external electric field during micellar enhanced ultrafiltration", The Shastri Indo-Canadian Institute Fund, 3 lakhs, 2008-2010. Foreign collaborator: Prof. S. Bhttacharjee, Department of Mechanical Engineering, The University of Alberta, Canada (**Completed**).
48. "Quantification and reduction of fouling by change in hydrodynamics and membrane surface modifications", Indo-Tunisia project under DST, 11 lakhs, 2009-2012, (**Completed**).
49. "Hybrid membrane processes for treatment of wastewater", involving Spain, Germany and India, DST-EU, 2012-2014, 22 lakhs, **(Completed)**.
50. "Forecasting Contaminant Percolation Through Soil Beds in India", Oxford University, 2016-2017, 16 lakhs. **(Completed)**

51. **"**A unified mathematical and engineering approach for design and performance prediction of an indigenous fluoride removal unit**", The Royal Society International Collaborative Project with Oxford University,** 2018-2022, 65 lakhs (**ongoing**).

***Ongoing Projects:***

1. "Tailor made design of photoreactor for advanced photocatalytic water treatment", Department of Science & Technology, 2021-2024, 18 lakhs
2. "Commercialization of indigenous hemodialysis cartridges for veterinary application and testing for human dialysis", Department of Science & Technology, 2021-2022, 10 lakhs.
3. "Development of nanoparticle incorporated polymeric high flux hollow fiber nanofiltration prototype for desalination of brackish water ", Department of Science & Technology & Ministry of Information & Technology, 2018-2023, 146 lakhs.
4. "Centre for Technological Excellence in Water Purification", Department of Science & Technology, 2019-2024, 530.77 lakhs.
5. Abdul Kalam Technology Innovation National Fellowship, Indian National Academy of Engineering, 2018-2022, 95 lakhs.

# Media coverage

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